MID-AIR COLLISION AVOIDANCE GUIDE

OFFUTT AFB, NEBRASKA

Revision T

This handbook is intended to provide general information only and is not a definitive manual or chart. Always consult current FAA regulations, available charts, and consider existing meteorological conditions. The charts are for information use only and are not to be used for navigation. Consult the latest issues of Sectional Charts and Airport/Facility Directories for flight planning. The United States Air Force accepts no liability for any claim arising under or as a result of reliance upon this handbook, and reserves protection from liability as afforded under the Federal Tort Claims Act, 28 USC, Section 2680.

TABLE OF CONTENTS

SECTION ONE

INTRODUCTION

FLIGHT SAFETY IN THE OMAHA/LINCOLN AREA

Fellow Aviators:

We are providing this brochure to you in the hope that the information contained will be useful to you while flying in the Omaha/Lincoln area. These areas have numerous airfields which operate airplanes at all speeds and sizes. The military flying activity in the area is very busy, operating aircraft ranging from T-38s to E-4s and C-5s. Offutt is a crossroads for both Navy and Air Force aircraft transiting the country; therefore, there are times when the Offutt traffic pattern gets saturated with different types of aircraft. Lincoln airfield, home to Nebraska Air National Guard operating KC-135 Stratotankers, gets congested with both military and civilian traffic. All pilots/aircrews, military and civilian, must be vigilant of the potential for mid-air collisions. Through education, awareness, and application of the *See and Avoid* concept, we can all share the skies more safely. While this brochure may be used as an aid for all aviators, it can't compare to a good pair of eyes and proper flight planning. We hope that this may be of use to you. If you have any questions about this brochure, or if you need additional copies, please feel free to call or write us.

For information, please contact 55th Wing Flight Safety at:
509 SAC Boulevard, Suite 1 fax (402) 232-4973
Offutt AFB, NE 68113-2099 ph. (402) 294-3404

SECTION TWO

AIRFIELD DESCRIPTION

1. Location:

Offutt AFB is located on the Southeast side of the Omaha area near the town of Bellevue. Coordinates are N41-07 W95-55.

2. Runway:

The airfield consists of a single concrete-surfaced runway oriented 125/305 degrees magnetic and designated as Runways 12 and 30. Runway elevation is 1,052 feet above sea level. The runway is 11,700 feet long and 300 feet wide. Runway 12 has a 1,000 foot displaced threshold and Runway 30 has a 1,100 foot displaced threshold. Both runways have TACAN and PAR approaches. Runway 30 also has an ILS approach. Figure 1 shows an airfield diagram.

3. Unique Runway Hazards:

Runway 12 at Offutt AFB presents certain problems not normally associated with runways used by heavy, multi-engine aircraft. Some important features of this runway are:

a. A relatively steep runway gradient which averages 0.7 percent downhill for the overall runway length. Runway 12 has a touchdown zone elevation of 1042' MSL (Runway 30 has a TDZE of 989' MSL).

b. The location of the approach end of Runway 12 is on top of a 50 foot-high embankment, creating unpredictable turbulence on approach and landing during medium to high surface winds.

c. The close proximity of large buildings or trees on both sides of the northwest half of the runway, creating variable mechanical turbulence and wind shear on the runway during crosswind conditions.

d. Caution should be used when the wind favors Runway 12 at Offutt AFB, as final traffic passes close to Millard airport at 2,800-3,000 feet MSL.

4. Taxiways:

The parallel taxiway is 100 feet wide and designated Taxiway C. Transient aircraft are parked on the upper ramp and can access the upper ramp by exiting the runway at Taxiway M or via the parallel, Taxiway C.

5. Hot Brake/Cargo Area:

The hot brake areas are located at the North hammerhead and Taxiway P. The hot cargo area is Taxiway M North.

6. Airfield Lighting:

a. Runway: Equipped with high intensity runway lights (HIRL). The five levels of intensity are controlled by the tower and may be adjusted upon pilot request.

b. Approach Lights: US lighting standard "B" with high intensity approach lights with sequenced flashers.

c. Precision Approach Path Indicators: Installed on the approach end of both runways (glide slope is 2.8 degrees for Runway 30 and 3.0 degrees for Runway 12).

d. Taxiways: The taxiways are lighted with standard blue taxiway lights.

e. Rotating Beacon: A standard military airport rotating beacon is located on top of a tower ½ mile north of the runway.

f. Obstruction Lighting: All prominent obstructions within the airfield boundary are marked with standard red obstruction lights.

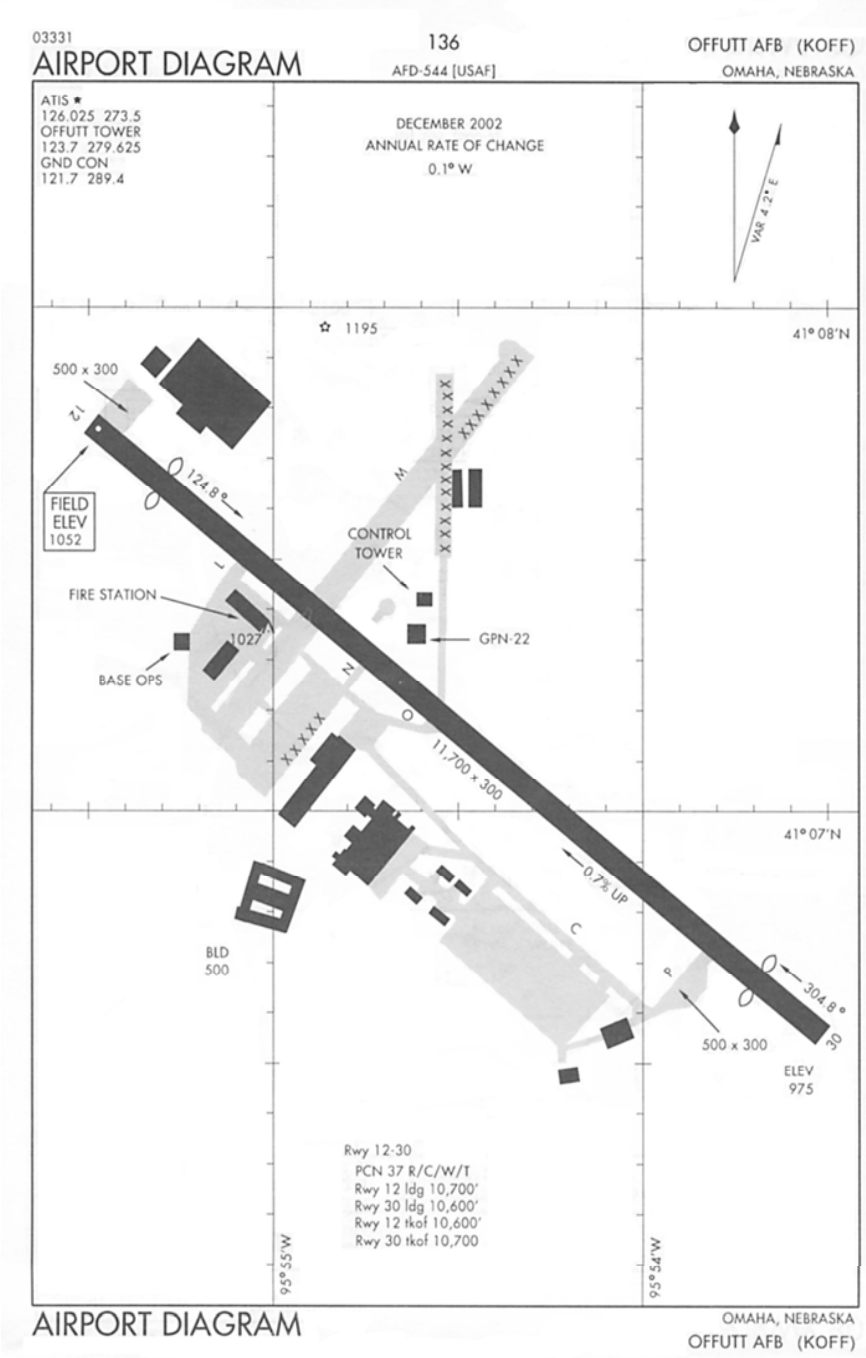


Figure 1

SECTION THREE

IFR/VFR PROCEDURES

1. IFR Procedures:

a. General: Offutt AFB is in Class C airspace. Omaha Radar Approach Control (RAPCON) controls the Class C airspace.

b. Departures: Departures are normally restricted to 3,000 ft MSL, and runway heading due to low altitude airways and arriving/departing commercial aircraft's flight path into Eppley Airfield.

c. Radar Traffic Pattern: The radar traffic pattern altitude for Offutt is 3,000 ft MSL. There are two smaller airfields near the edges of Offutt's radar pattern. These are Plattsmouth Municipal and Millard Field. Aircraft operating near 3,000 feet around these airfields need to be especially alert for military aircraft operating in the instrument pattern.

2. VFR Procedures:

a. Traffic Pattern: The rectangular VFR traffic pattern is at 2,500 ft MSL for large aircraft and 2,000 ft MSL for small aircraft. The overhead pattern is 3,000 ft MSL. Traffic will always be to the southwest of the runway, with right-hand traffic for Runway 12 and left-hand traffic for Runway 30. Deviations will only be authorized by the control tower.

b. Departures: Aircraft will maintain runway heading at or below 3,000 ft MSL until directed to turn by tower or approach control.

c. South Practice Area: Aircraft operating out of the Offutt AFB Aero Club use an area south of Offutt as a practice area. This area is located 10 miles south of Offutt and just west of the Plattsmouth Airport. Heavy VFR traffic can be expected in this area.

3. Low-Level Routes:

There is one low-level military training route that encompasses the Omaha area. It is mainly used by F-16 aircraft practicing tactical low-level formation and ground attack tactics. The altitude boundaries range from 500 ft AGL up to 10,000 ft MSL. The route is labeled as VR 540/541. Figure 2 depicts the low-level route.

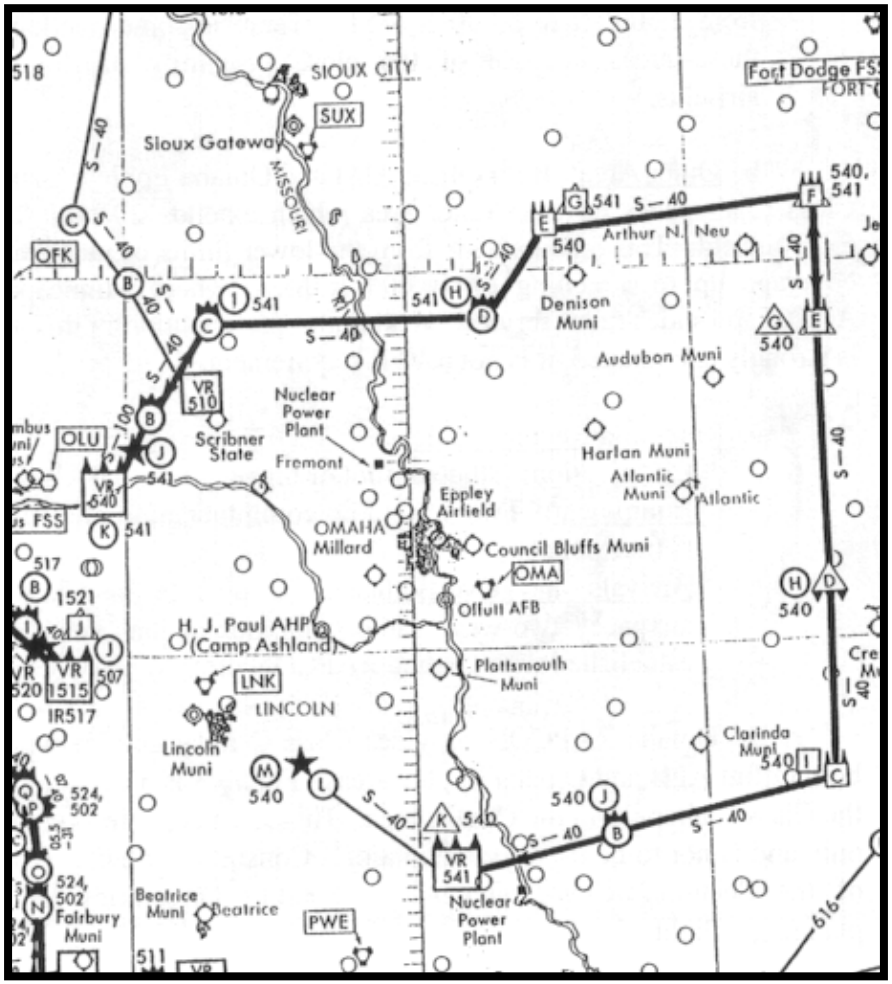


Figure 2

4. Class C Airspace:

a. Boundaries: The boundaries of the Omaha/Offutt Class C airspace are as follows:

1. First, there is an inner "core" which consists of a 5 NM radius which extends outward from each airport. It extends from the surface up to 5,000' MSL.
2. Second, there are shelf areas which have a 10 NM radius around each airfield. These areas encompass an area from 2,500' ft to 5,000 ft MSL. There is some overlap of these areas because of the close proximity of the two airfields.

b. Outer Area: Both Offutt AFB and Omaha Eppley Airfield Class C airspaces have an outer area which extends 20 NM from each airfield. This area extends from the lower limits of radar/radio coverage up to a ceiling of 10,000 ft MSL where Minneapolis ARTCC provides radar service. While pilot participation in this area is strongly encouraged, it is not a VFR requirement.

c. Rules and Requirements:

Certification: Student pilot or higher

Equipment: Two-way radio communication and Mode C transponder

Arrivals and Overflights: To operate in Class C airspace two-way radio communication must be established with Omaha RAPCON prior to entry.

d. Omaha RAPCON provides Class C radar service within both Offutt AFB and Omaha Eppley areas.

Offutt AFB Operations

Figure 3 is a depiction of Offutt's VFR and IFR pattern. Notice the proximity to Milliard airport! Aircraft transitioning north and south of Omaha area are strongly encouraged to avoid Offutt's pattern altitudes and take advantage of Class C radar services.

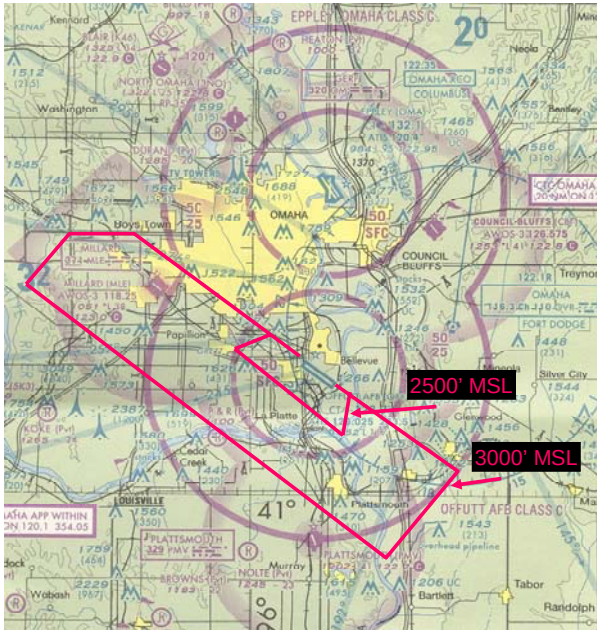


Figure 3

SECTION FOUR

LINCOLN OPERATIONS

Offutt assigned aircraft, among other military aircraft, frequent Lincoln field for training. The lack of congestion, runway available, and other KC-135 agencies make the field attractive for pattern work and divert options. It isn't uncommon to see two or three 135's and E-4's in the pattern performing touch and go's anytime of the day. Figure 4 depicts the IFR and VFR pattern.

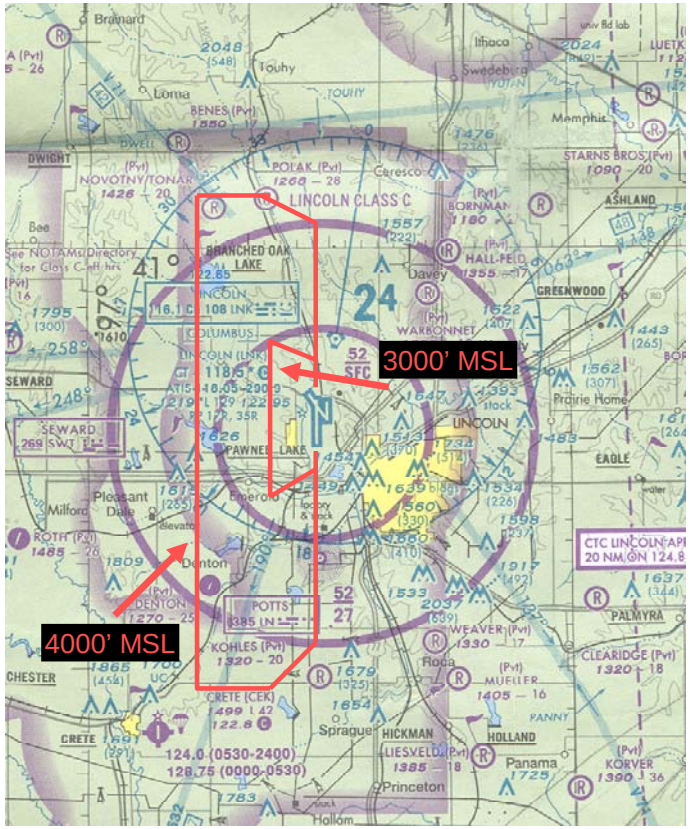


Figure 4

SECTION FIVE

LOCAL AIRCRAFT DESCRIPTION

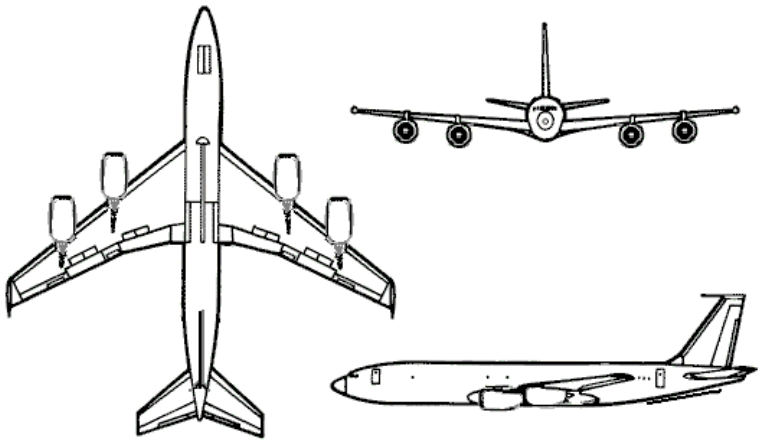
Offutt AFB has many different aircraft assigned to the base. The most common aircraft are variations of the C-135 series aircraft including EC/KC/OC/RC/TC/WC-135 aircraft, in the following models: B,C,E,S,U,V,W and X. They are equipped with either TF-33 or CFM-56 turbofan engines which produce between 18,000 and 21,000 pounds of thrust at takeoff. Maximum takeoff weight exceeds 300,000 lbs.

There are four E-4B aircraft stationed at Offutt. This aircraft is the military version of the Boeing 747. They are equipped with F-103 turbofan engines which produce up to 51,000 pounds of thrust at takeoff. They can takeoff at weights exceeding ***800,000*** lbs! (Can you say wake turbulence?)

The C-21A is a military version of the Gates Lear 35 business jet, which frequently transitions Offutt AFB.

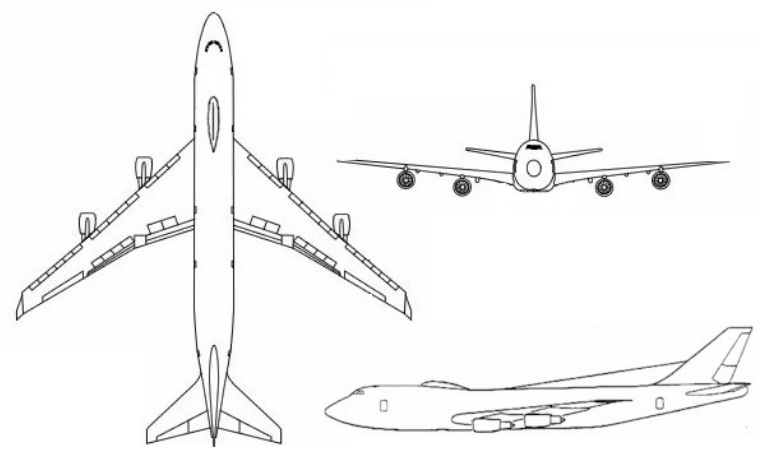
Offutt AFB also has an Aero Club which operates numerous types of light, single and twin-engine civilian aircraft.

BOEING C-135



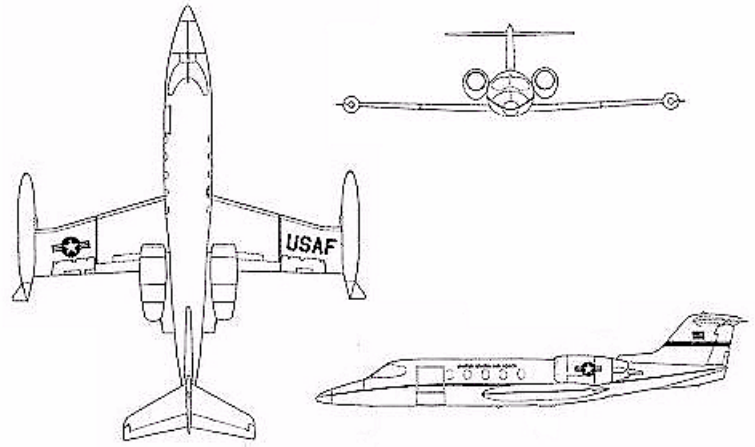
RATE OF CLIMB **1000 - 4000 FPM**
APPROACH SPEEDS **130 - 180 KIAS**

BOEING E-4B (B-747)



RATE OF CLIMB **1000 - 2500 FPM**
APPROACH SPEEDS **140 - 165 KIAS**

C-21A (GATES LEARJET)



RATE OF CLIMB: **3000 - 5000 FPM**
APPROACH SPEEDS: **120 - 130 KIAS**

SECTION SIX

TIPS ON MID-AIR COLLISION AVOIDANCE

Studies on mid-air collisions show that most occur below 8000 ft MSL and near airports, navaids, and other high-density traffic areas. Here are some ideas to help reduce your mid-air collision potential:

1. Know where high-density traffic areas are.
2. Fly as high as practical.
3. Obtain an IFR clearance or participate in radar flight following whenever possible, and continue to practice "*see and avoid"* at all times.
4. Use landing lights at lower altitudes, especially when near airports.
5. Announce your intentions on unicom and use standard traffic pattern procedures at uncontrolled fields.
6. Always use your Mode C transponder, and cross-check its accuracy with ATC whenever possible
7. Use hemispheric altitudes. Practice altimeter discipline!
8. Constantly clear for other aircraft, both visually and on the radio.
9. Keep your windshield clean and clear.
10. Don't get complacent during instruction! Instructors make mistakes too. Many mid-air collisions occur during periods of instruction or supervision.
11. When flying at night, don't use white interior lights if you don't have to. It takes your eyes a while to adjust to low light levels.
12. Understand the limitations of your eyes and use proper visual scanning techniques. Remember, if another aircraft appears to have no relative motion, but is increasing in size, it is on a direct collision course with you.
13. Execute appropriate clearing procedures before and during all climbs, descents, turns, abnormal maneuvers, or aerobatics.
14. Above all, **AVOID COMPLACENCY**! Remember, there is no guarantee that everyone is flying by the rules, or that anyone is where they are supposed to be.

SECTION SEVEN

FACTORS AFFECTING VISION

Eye sight is essential to avoiding other aircraft, yet our eyes have limitations too. Being aware of these limitations will improve our ability to see and avoid. The following is a brief discussion of some factors affecting our vision.

1. SPACE MYOPIA: At high altitudes, without objects to focus on, (horizon, clouds, etc.) the eyes tend to focus at the windscreen or just outside the cockpit, greatly reducing the sighting distances. Shifting your gaze frequently to instrument panel, ground features, distant objects (if available), etc. will help overcome this factor.

2. FIXATION: Avoid the tendency for fixation. Scan in sectors, shifting your gaze vertically as well as horizontally; practice focusing on objects of known or accurately estimable distances when available.

3. FOCUSING: The time required for the eyes to change their focus from one object to another (accommodation time) is at least 2 1/2 seconds--for example the time it takes to change focus from the instrument panel to outside the aircraft. This time increases with fatigue and age.

4. CONTRAST: Contrast of objects is very important in avoiding other aircraft. Sky conditions on many occasions make it much more difficult to detect another aircraft, especially during periods of low-light illumination.

5. HYPOXIA: Hypoxia can affect the ability of the eyes to detect distant objects, especially at night. Due to the lack of oxygen in the blood, the eyes suffer a loss of acuity and have difficulty in focusing. Smokers must be especially aware of this factor. The smoker's blood is carrying carbon monoxide which displaces some of the oxygen and makes the effects of hypoxia more apparent at lower altitudes than for non-smokers.

6. LACK OF RELATIVE MOTION: This factor is one of the more dangerous ones because aircraft that are on a collision course have no relative motion. When there is a lack of motion, there is more time needed to detect and identify other aircraft. Objects that move across the windscreen are much easier to detect. In order to avoid the apparent collision, take evasive maneuvers to cause the other aircraft to move in some direction on your windscreen.

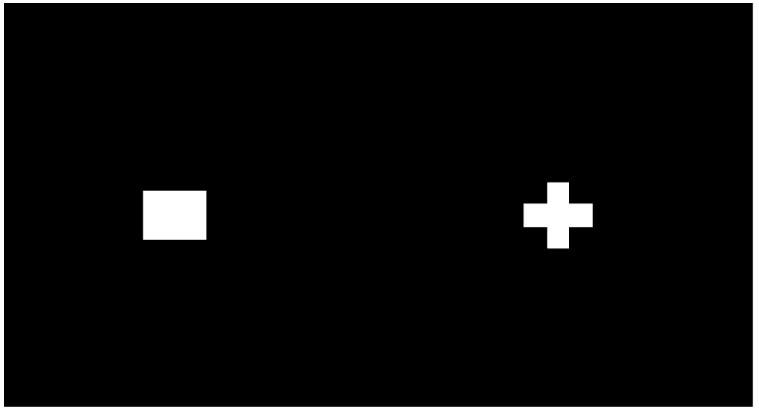
7. NEARSIGHTEDNESS: The normal eye with 20/20 vision can detect an aircraft with a fuselage diameter of 7 feet from about 4 miles away. If you are nearsighted (myopic), you will not be able to see the aircraft until it is closer. How close depends on how nearsighted you are. The more severe the myopia, the closer the aircraft must be before it is detected. For safety's sake, please wear your prescription glasses.

8. SCANNING: Where and how you look is important too. There is no scan that works best for all pilots. The most important thing is for each pilot to develop and **USE** a scan that is usable for them--in their own aircraft. One of the best techniques in scanning is to scan in sectors, both vertically and horizontally.

9. BLIND SPOT: The human eye has a blind spot where the optic nerve attaches to the retina in the back of the eye. The location of the blind spot for most people is about 30 degrees right of center. With both eyes unobstructed, the peripheral vision of one eye cancels out the blind spot on the other eye. However, a windshield post, a large smashed bug or other obstruction to your vision could negate how your brain compensates for your blind spot. Under certain conditions, visual blocking occurs at 1 nautical mile for a C-135 and 1 1/2 miles for an E-4B (B-747). Some of the most important times to have your head out of the cockpit are during descent and climbout, when flying on airways, and especially while on final approach. Don't forget to look behind, below, and to the side at least once. Avoid tunnel vision--pilots often rivet their eyes to the touchdown zone.

BLIND SPOT SELF-TEST

Cover or close your right eye and focus your left eye on the cross. Move the diagram toward you until the square disappears. To try this on your right eye, turn the diagram upside down.



SECTION EIGHT

WAKE TURBULENCE

You may be able to see and avoid the big airplanes, but one thing you can't see is their wake turbulence! There is an area of potential disaster behind and below every commercial and military aircraft. Wake turbulence can be deadly, especially when it is encountered close to the ground. The United States averages about one mishap per month and one fatal mishap a year (mostly to small general aviation aircraft) due to vortices. All pilots flying in the vicinity of large, heavy aircraft should exercise extreme caution and ensure 6 to 10 minutes of separation depending on the type of aircraft. Remember that wake turbulence can be so severe as to cause total loss of aircraft control and/or catastrophic structural failure. A good rule of thumb to use is: if the aircraft in front of you is larger than your aircraft, make sure you have adequate separation to allow the vortices to dissipate. Even F-15 and F-16 fighters create significant wingtip vortices, especially in a clean configuration.

Some general information on wake turbulence:

- The more drag devices that an aircraft has extended (flaps, landing gear, speedbrakes, etc.) the smaller the vortices will be.
- Wingtip vortices normally sink around 500 fpm.
- Departing aircraft start producing wingtip vortices at rotation (when the load is changed from the landing gear to the wings).
- Light crosswinds (5 knots) can cause a vortex to remain on the runway for longer periods of time than in calm conditions.
- When taking-off after a departing jet, a good technique is to plan to lift-off before the rotation point of the departing aircraft and continue to climb above or away from its flightpath.
- Vortices created by a C-5 or E-4 can have tangential velocities of approximately 9,000 fpm
- Heavy, slow, clean-configured aircraft create the strongest awake turbulence.

SECTION NINE

REPORTING NEAR MID-AIR COLLISIONS

1. Purpose and Data Uses:

The primary purpose of the Near Mid-air Collision (NMAC) Reporting Program is to provide information for use in enhancing the safety and efficiency of the National Airspace System. The data from these reports is investigated, compiled, and analyzed by the FAA, who in turn makes safety program recommendations.

2. Definition:

A near mid-air collision is defined as an incident associated with the operation of aircraft in which a possibility of collision occurs as a result of proximity of less than 500 feet to another aircraft, or a report is received from a pilot or a flight crew member stating that a collision hazard existed between two or more aircraft.

3. Reporting Responsibility:

It is the responsibility of the pilot and/or flight crew to determine whether a near mid-air collision did actually occur and, if so, to initiate a NMAC report. Be specific, as ATC will not interpret a casual remark to mean that a NMAC is being reported. The pilot should state "I wish to report a near mid-air collision." Report these incidents immediately or as soon as practicable to the nearest FAA ATC facility or Flight Service Station. Be as thorough in your report as possible. See the *Aeronautical Information Manual* for specific items to be reported.

SECTION TEN

BIRD AIRCRAFT STRIKE HAZARD (BASH)

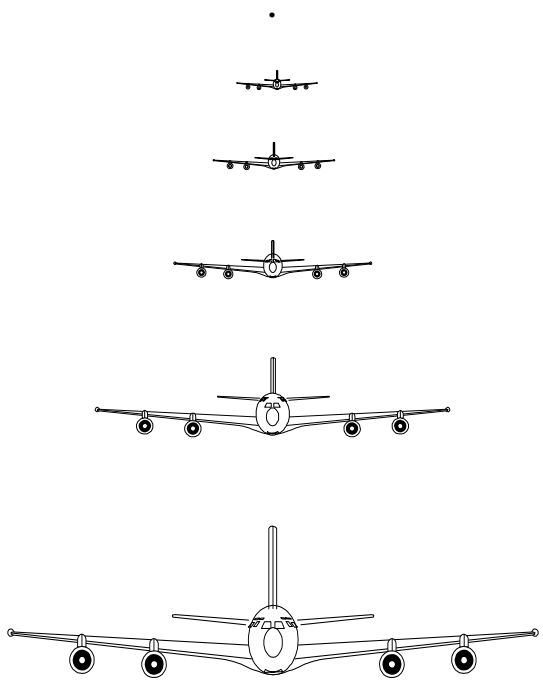
A bird strike hazard exists at Offutt AFB, NE and vicinity due to resident and migratory bird species. The base is located adjacent to the Missouri River which is a major migratory route for waterfowl. Located to the south of the base is a 113-acre base lake. Additionally, surrounding crop land and a pair of smaller fish ponds make this area a major attraction for birds and waterfowl. These areas are also home to a flock in excess of 200 resident Canada geese. On the base itself, current drainage schemes and the level of the water table allow for water to collect in open retention ponds on both sides of Runway 30. Continuous efforts are made to make the field unattractive to the birds and mitigate the risk. Be aware that daily and seasonal bird movements create various hazardous conditions.

C-135 CLOSURE RATE CHART

This is based on combined speeds of two aircraft

DISTANCE SECONDS

	AT 600 MPH	AT 210 MPH
10 MILES	60	170
5 MILES	30	85
3 MILES	18	56
2 MILES	12	38
1 MILE	6	18
0.5 MILE	3	9



The areas in the gray box are the danger areas.
This is based on recognition and reaction times.